Railing of reefer containers from Gauteng
A major boost for citrus exports

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The production estimate for the northern regions suggests that approximately 100 million (15 kg equivalent) cartons could be packed and shipped for export over the next 3 - 5 years. This volume is up from 72.4 million cartons in 2017, 83.5 million in 2018 and 67 million in 2019. One of the notable problems that are likely to arise, given the significant increase in volume that is most likely to be shipped from the Durban port:

1. Demand on road transport: It has been calculated that there will likely be an increased demand for up to 400 road truck trips per week to transport the additional volume. This equates to roughly 8 000 road truck trips per annum. It is foreseen that the demand for road transport will grossly outstrip supply.

2. Durban cold storage capacity: At this present time, the Durban port has a collective 55 000 pallets cold storage capacity. By 2025 the peak season capacity requirement is likely to reach 72 000 cold storage pallet spaces.

3. Durban port operations: The Durban port operations face many challenges in peak season. It is likely that additional volume of containers will exacerbate the operational challenges in the port.

Given these challenges, the only viable alternative is to increase the railing of citrus exports in containers from the inland regions. In fact, the Citrus Growers' Association (CGA) has identified that at least 10 000 reefer containers of citrus will need to be railed to the ports by 2025, to offset the vast increase in road transport and cold storage demands that will likely arise by then.
The main rail sites that are presently railing containers is from Tzaneen, Bela-Bela and Musina in Limpopo.

Sum of pallet quantity	Commodity production region			
	GRAPEFRUIT			
Country	Hoedspruit	Letsitele	Limpopo River	Grapefruit TOTAL
Russian Federation	7 680	4 860	1 371	13 911
United Arab Emirates	438	523	823	1 784
Bangladesh				
Saudi Arabia	125	201	144	470
Hong Kong	1 648	3 478	454	5 580
Canada	2 090	2 612	1 368	6 070
Iraq				
Malaysia	216	171	481	868
Kuwait	75	12	175	262
Singapore	100	288	94	482
Qatar	53	54	42	149
Oman	20	36	20	76
Bahrain	4	1	20	25
Grand Total	12 449	12 236	4 992	29 677

There are many challenges to increase the volume of containers railed from these sites, such as limited ground space to store empty and full containers, limited electricity supply and reefer plug points, and not enough reefer train sets. When considering these challenges the only viable alternative that could be considered is railing reefer containers from Gauteng to ports for export. Since the Durban port experiences a severe cold storage capacity shortage during the citrus season, the opportunity to store citrus and pack from ambient warehouses makes a lot of sense as a viable alternative to free up congestion at the Durban port. Exports of grapefruit, lemons and Valencias to markets that do not require precooling of the product can be stored in ambient conditions, upon which the reefer containers are packed then plugged to power immediately afterwards.

The containers then being transferred to rail and transported to port under power. Dr Paul Cronjé (et al) has done extensive research on loading of ambient fruit into reefer containers. The trials show that a container can cool ambient fruit to set point (e.g. 4.5°C) after approximately 72 hours of packing the container. In some respects this method can be more conducive to applying a better cold chain than the conventional method of transporting citrus to port cold stores for export. A truck could stand in Durban for 48 hours with fruit remaining in ambient for a further 24 hours before being placed into the cold rooms.

Laeveld Citrus conducted a trial on a shipment of containers destined for Saudi Arabia. The fruit was transported from the farm using traditional trucks and offloaded at an ambient warehouse in City Deep. The same day the fruit was packed into containers and plugged in at the Transnet Freight Rail terminal in City Deep. After a few days, the containers were then transferred to a reefer train and the containers were railed to the Durban Container Terminal for export.

Table reflecting the volume of pallets that can be railed ex Gauteng

LEMONS					VALENCIAS					
Senwes	Hoedspruit	Limpopo River	Letsitele	Lemons TOTAL	Letsitele	Senwes	Limpopo River	Hoedspruit	Valencias TOTAL	GRAND TOTAL
3 569	4 027	648	519	8 763	16 736	6 595	8 531	9 625	41 487	64 161
8 171	3 701	1 168	942	13 982	7 262	4 017	2 711	2 728	16 718	32 484
1				1	14 475	4 462	6 317	1 702	26 956	26 957
2 871	2 731	1 051	1 361	8 014	8 041	2 790	2 822	3 615	17 268	25 752
1 898	1 659	544	253	4 354	4 348	4 723	1 700	3 093	13 864	23 798
1 921	405	26	180	2 532	643	1 946	1 242	869	4 700	13 302
1 362	110	323	95	1 890	3 510	4 485	1 536	569	10 100	11 990
1 484	624	449	86	2 643	2 139	1 923	1 276	708	6 046	9 557
1 026	165	310	292	1 793	3 720	988	995	458	6 161	8 216
586	535	297	37	1 455	2 188	1 483	1 137	516	5 324	7 261
729	260	223	508	1 720	2 698	935	500	267	4 400	6 269
185	620	267	341	1 413	1 999	510	242	121	2 872	4 361
619	297	217		1 133	691	331	173	188	1 383	2 541
24 422	15 134	5 523	4 614	49 693	68 450	35 188	29 182	24 459	157 279	236 649

From the temperature download data the following information was provided:

1. The trucks left Laeveld Citrus on 5 September, arriving at the warehouse in City Deep on the same day.
2. The containers were packed from 5 September until the morning of the 6 September.
3. All the containers were plugged in at the Transnet City Deep terminal on 6 September.
4. Six containers were packed with five of the containers reaching the Delivery Air Temperature (DAT) on 10 September, four days after plugging in the container. (The last container had a condenser issue and came on temperature on 11 September, after being replaced.)
5. All of the containers maintained temperature until being unpacked in Dubai on 13 October for onward transport to Saudi Arabia.

Key guiding principles of the trial:

1. Ensure all fruit transported to the ambient warehouse can be packed into containers within 48 hours of arrival at the warehouse. In this trial five trucks transported 24 pallets, each making up 120 pallets and six container lots.
2. The containers should immediately be plugged in to a power source.
3. When railing to port, ensure all the containers are transported under power such as on the reefer trains.
4. Place temperature recorders that have GPS capability into as many pallets as possible to receive live location and temperature data. This will provide a detailed analysis of the movement and cold chain conditions of the cargo while in transit to the destination.
5. Ensure there is good communication and planning of the shipment to reduce any risks and delays.

Operationally, the trial went very well with no problems being detected throughout the transport from farm to receipt in the receiving country. Another important revelation was the impeccable cold chain footprint that was identified. Some of the pallets had Sensitech GPS temperature recorders that permitted the receipt of the air temperature inside the cartons. The data was visible online from the farm, all the way to the destination where the customer received the containers. The trail gave conclusive evidence that the packing of containers in Gauteng (in this case in City Deep, from ambient conditions into containers that are immediately plugged in and transported to port under power) provides a suitable and sustainable alternative to transporting citrus to Durban cold stores for export.